# AN ANALYSIS OF THE EFFECT OF LOWERED BASIC TEST BATTERY SELECTION SCORES ON REPHASALS AND DISENROLLMENTS AT SELECTED COAST GUARD CLASS A SCHOOLS

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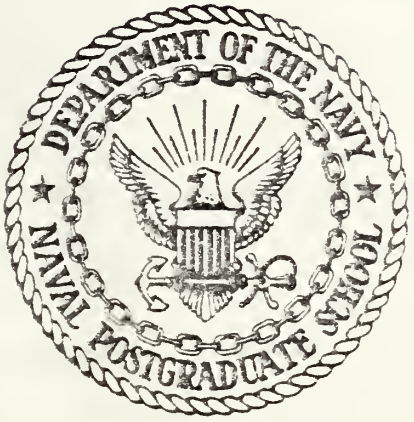


# THESIS

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by

Daniel E. Kalletta

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It compares the performance of students entering these schools with the lower BTB scores with those students entering with the higher BTB scores during FY 1977. In addition, it analyzes the relationship between the successful completion of these schools and the BTB selection scores.

The results indicate that students with BTB scores lower than the earlier (higher) cutoff tend to have higher rephasal and disenrollment rates than students with the higher BTB scores. If the input percentage of the lower-scoring students should increase, there is likely to be a significant increase in both the rephasal and disenrollment rates for all three schools.

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# An Analysis of the Effect of Lowered Basic Test Battery Selection Scores on Rephasals and Disenrollments at Selected Coast Guard Class A Schools

by

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This thesis investigates and evaluates the effect of lowered Basic Test Battery (BTB) selection scores on rephasals and disenrollments at selected Coast Guard Class A schools. It analyzes the differences in rephasal rate and disenrollment rate for Storekeeper, Subsistence Specialist, and Radioman Schools for the year prior to (FY 1976) and the year after (FY 1977) the lowering of the BTB selection scores (which occurred in July, 1976). It compares the performance of students entering these schools with the lower BTB scores with those students entering with the higher BTB scores during FY 1977. In addition, it analyzes the relationship between the successful completion of these schools and the BTB selection scores.

The results indicate that students with BTB scores lower than the earlier (higher) cutoff tend to have higher rephasal and disenrollment rates than students with the higher BTB scores. If the input percentage of the lower-scoring students should increase, there is likely to be a significant increase in both the rephasal and disenrollment rates for all three schools.

TABLE OF CONTENTS

LIST OF TABLES

# I. INTRODUCTION

## A. BACKGROUND

The primary objective of Class A training in the United States Coast Guard is to meet manpower training requirements at the technical speciality level. With the increasing technological demands of the Coast Guard, more trained personnel are becoming a necessity. Class A training also assists in fulfilling the Coast Guard's obligation to provide career opportunities for its enlistees. Without a speciality a career is impossible. In a study (Muldrow, 1969) conducted for the U.S. Navy, it was discovered that the opportunity to obtain technical training was one of the major personal reasons influencing enlistment into the Armed Forces. Considering these points, the Coast Guard had to ensure that a steady influx of Class A school eligible personnel would be available to meet its service requirements.

Prior to the implementation of the All-Volunteer Force (AVF) this was not a major problem; in fact, the Coast Guard enjoyed a rather favorable recruiting and selection climate. However, with the advent of the AVF and the attention that was given to insuring that all individuals in the Coast Guard had equal opportunities for training and advancement, it was anticipated that Class A school selection standards would have to be modified to accommodate

less qualified personnel. These standards as stated in the Coast Guard Personnel Manual (CG-311) require that a Class A school applicant meet:

1) The minimum Basic Test Battery scores required by the school.

2) Any special physical requirements (normal hearing, color perception, etc.) required by the school.

3) Appropriate action to obtain the security clearance required by the school.

Of these requirements, a combination of the test scores attained on the Basic Test Battery is the primary selection tool utilized for personnel assignment to Class A training.

The Basic Test Battery (BTB) consists of five tests administered to incoming recruits at Recruit Training Centers. These five tests include the:

1) General Classification Test (GCT) which measures the ability to understand words and the relationships between them.

2) Arithmetic Test (ARI) which measures the ability to use numbers and apply mathematical reasoning in practical problems.

3) Mechanical Test (MECH) which measures some aspects of mechanical and electrical knowledge in addition to the ability to understand mechanical principles.

4) Clerical Test (CLR) which measures the ability to observe rapidly and accurately.

5) Electronics Technican Selection Test (ETST) determines abilities specifically related to successful completion of electronics type training.

A Coast Guard study (West, et al., 1975) addressed the subject of the validity of the BTB composites utilized as selection score standards for Class A schools. The study examined BTB scores and performance data for students attending 10 selected Coast Guard Class A schools during fiscal year (FY) 1973. It was determined that the BTB was a reliable predictor of performance at these 10 schools. Through regression analysis alternate selection composites considered more effective were identified for many of the schools.

Another study (Lang, 1976) conducted by the Coast Guard evaluated the effectiveness of selection tests in predicting performance at Class A schools. The particular school examined was the Machinery Technician School (MK). Lang analyzed the validity of both the BTB and Armed Forces Vocational Aptitude Battery (ASVAB) in predicting performance at MK School. The data utilized was collected from 134 students attending this school during the last part of FY 1974 and the beginning of FY 1975. The study revealed that the BTB and ASVAB are valid predictors of performance at MK School. Also, new selection composites for MK school were presented.

From the information gathered through the above-mentioned studies, lower BTB selection composites were established. These new composites were determined by the personnel working at the Psychological Research Center at the Office of Personnel located at Coast Guard Headquarters in Washington, D.C. Mr. Joseph Cowan, head of the Research Center, stated that the lower selection scores were arrived at by extending the regression lines determined by Lang and West, et al. The present and previous selections scores are shown in Table I.

The lowering of the selection scores had a positive effect on the Class A eligible population. Specifically, the overall population eligibility increased from 50% to 80% while the qualified disadvantaged went from 10% to 50%.

B. PURPOSE

Since the implementation of the lower selection standards for Class A schools, no research has been conducted to evaluate the effect of lower selection scores on rephasals and disenrollments. It is the opinion of the Coast Guard Training Centers that rephasals and disenrollments have increased and that students of lower ability are requiring more attention. No data has been produced to support or disprove this opinion. This study was undertaken to investigate and evaluate the effects of lowered selection scores on rephasals and disenrollments. Attention was

also given to the outcome of students entering with the lower selection scores.

## C. DATA COLLECTION

The data utilized in this study were collected from the Storekeeper School, Subsistence Specialist School, and Radioman School, all located at Petaluma, California. The time period included one year prior to (FY 1976) and one year after (FY 1977) the lowering of the selection scores (which occurred in July, 1976). For FY 1976 the data was collected from the Weekly Training Reports issued by the individual schools and included the number of students per class, number of rephasals per class, number of disenrollments per class, and the number of graduates per class. The FY 1977 data was on individual students and gathered from Student Classification Sheets, Class Convening Rosters, and Graduation Statistic Sheets. Variables included the student's class, number of rephasals, disenrollment, BTB scores, education level completed, source (field or boot camp), and final grade.

## D. ANALYSIS METHODOLOGY

The Statistical Package for the Social Sciences (SPSS) on the IBM 360 Computer System located at the Naval Postgraduate School was utilized to accomplish the statistical calculations required in this study. Study One analyzed the data provided by class. The means and standard

## TABLE I

### MINIMUM CLASS A SELECTION SCORES

| RATING | PREVIOUS SCORES | PRESENT SCORES |
|---|---|---|
| DC | GCT+ARI=105 | GCT+ARI=90 |
| DT | GCT+ARI=100 | GCT+ARI=90 |
| ET | GCT+ARI+ETST=170 | GCT+ARI+ETST=155 |
| ETN | GCT+ARI+ETST=170 | GCT+ARI+ETST=155 |
| FT | GCT+ARI+ETST=170 | NO CHANGE |
| GM | ARI+MECH=100 | GCT+MECH=90 |
| HM | GCT+ARI=100 | GCT+ARI=90 |
| MK | ARI+MECH=105 | GCT+MECH=90 |
| MST | GCT+ARI+CLER=165 | GCT+ARI+CLER=150 |
| RD | GCT+ARI=105 | GCT+ARI=90 |
| RM | GCT+ARI=100 | GCT+ARI=90 |
| ST | ARI+2X ETST=171 | NO CHANGE |
| SK | GCT+ARI=105 | GCT+ARI=90 |
| SS | GCT+ARI=100 | GCT+ARI=90 |
| TT | GCT+ARI+ETST=170 | GCT+ARI+ETST=155 |
| YN | GCT+ARI=105;CLER=55 | GCT+ARI=90;CLER=50 |
| AE | ARI+2X ETST =160 | NO CHANGE |
| AT | GCT+ARI+ETST=170 | GCT+ARI+ETST=155 |
| AD | ARI+MECH-110 | ARI+MECH=100 |
| AM | ARI+MECH=105 | NO CHANGE |
| ASM | GCT+MECH=105 | NO CHANGE |
| QM | GCT+ARI+CLER=165;CLER=50 | GCT+ARI+ETST=165;55 IN EACH |
| EM | ARI+MECH=105 | ARI+MECH=90 |

deviations for the rephasal rates and disenrollment rates were calculated for each school for FY's 1976 and 1977. This data was tested to ensure that it meet the criteria for an analysis of variance (which it did). An analysis of variance was accomplished for both the rephasal rates and disenrollment rates with the main effects being school and year.

Study Two focused on the analysis of the data collected on individual students. The purpose of this study was to investigate and evaluate the outcome of the students entering with the lower BTB scores. This analysis was accomplished by analyzing the effect that these students had on rephasals and disenrollments. Also, a stepwise regression was carried out for all the schools together and each school individually. Of primary interest was the relationship between the BTB selection scores and the three dependent variables, rephasal, disenrollment, and final grade. Other variables included school, source, education level completed, and quarter in which a student started a school.

## E. CONCLUSIONS

From the analysis completed in Study One it was determined that lowering the BTB selection score had a small but statistically significant effect on rephasal rate but not disenrollment rate. Through the results of Study Two it was shown that students entering Storekeeper, Subsistence

Specialist, and Radioman Schools with lower BTB scores had a greater incidence of rephasals and disenrollments. During FY 1977 1/3 of the students attending these schools entered with lower BTB selection scores than those in effect prior to July, 1976. If the input percentage of these students increased there should be a significant increase in both the rephasal and disenrollment rates for these schools.

## II. STUDY ONE

### A. METHODOLOGY

The purpose of Study One was to investigate and evaluate the effect that lowering the BTB selection scores for entrance to Class A schools had on rephasals and disenrollments. The data utilized was collected by class, and a breakdown by school and fiscal year is provided in Table II.

TABLE II

| SCHOOL | NUMBER OF CLASSES FY 1976 | NUMBER OF CLASSES FY 1977 |
|---|---|---|
| STOREKEEPER | 13 | 13 |
| SUBSISTENCE SPECIALIST | 12 | 12 |
| RADIOMAN | 13 | 12 |

The variables utilized were:

1) Rephasal Rate - defined as the number of rephasals (not the number of students rephased) per total number of students. In other words, if a student was rephased three times this would be equivalent to three rephasals. Defining the rephasal rate in this manner was required because the data collected for FY 1976 was by class.

2) Disenrollment Rate - defined as the number of students disenrolled per total number of students.

3) School - defined as the three schools, Storekeeper School, Subsistence Specialist School, and Radioman School, from which the data was collected.

4) Year - defined as the year prior to or after the BTB selection standards were lowered. The prior year was FY 1976 and the year after was FY 1977.

The first task of this study was to determine the basic distributional characteristics of each of the variables to be used in the subsequent statistical analysis. Information on the distribution, variability, and central tendencies of the variables was calculated utilizing the SPSS system. This data was evaluated to ensure that it met the necessary conditions for a Two-way Analysis of Variance.

The next task was to isolate and identify the percentage of variation in the rephasal rate and disenrollment rate (dependent variables) due to the different schools and years (independent variables). A similar but separate analysis was accomplished for each of the dependent variables. The 2x3 factorial design utilized was as follows:

Independent Variable and Category

School:

1) Storekeeper
2) Subsistence Specialists
3) Radioman

Year:

1) FY 1976
2) FY 1977

The first step in this analysis was to determine whether the two factors, school and year, as a whole as

well as individually have a statistically significant effect on the variation in either the rephasal rate or disenrollment rate. In conjunction with this the proportion of variance due to each factor was determined. The next step was to examine whether the interaction effect (school x year) was significant. Through this analysis, it could be determined whether the school, year, or both had an effect on rephasal rate or disenrollment rate.

B. RESULTS

1. Means and Standard Deviations

The means and standard deviations for the rephasal and disenrollment rates are shown by school and year in Table III.

2. Analysis of Variance

A Two-way Analysis of Variance was conducted to evaluate the effect of year and school on rephasal rate. The results are shown in Table IV.

In Table IV the joint effect and individual main effects are both significant while the interaction effect is of marginal significance. This marginal significance might prove either significant or insignificant if a larger sample was utilized. To speculate on this near-significance is unwise; therefore, in this analysis the interaction was considered not significant. Because there is no significant interaction, the effects of the two factors

TABLE III

| SCHOOL | YEAR(FY) | REPHASAL RATE MEAN | REPHASAL RATE STD DEV | DISENROLLMENT RATE MEAN | DISENROLLMENT RATE STD DEV |
|---|---|---|---|---|---|
| STOREKEEPER | 1976 | .061 | .059 | .038 | .040 |
| | 1977 | .180 | .156 | .056 | .058 |
| | TOTAL | .120 | .130 | .047 | .050 |
| SUBSISTENCE | 1976 | .142 | .102 | .134 | .097 |
| | 1977 | .143 | .107 | .140 | .090 |
| | TOTAL | .142 | .102 | .137 | .092 |
| RADIOMAN | 1976 | .678 | .179 | .208 | .116 |
| | 1977 | .849 | .208 | .219 | .070 |
| | TOTAL | .760 | .208 | .214 | .095 |
| 1976 | TOTAL | .298 | .305 | .127 | .113 |
| 1977 | TOTAL | .385 | .365 | .136 | .099 |

TABLE IV

ANALYSIS OF VARIANCE - REPHASAL RATE

| SOURCE OF VARIATION | SUM OF SQUARES | DF | MEAN SQUARE | F | SIGNIF OF F |
|---|---|---|---|---|---|
| MAIN EFFECTS | 6.793 | 3 | 2.264 | 109.159 | 0.000 |
| SCHOOL | 6.650 | 2 | 3.325 | 160.297 | 0.000 |
| YEAR | 0.182 | 1 | 0.182 | 8.765 | 0.004 |
| 2-WAY INTERACTIONS | | | | | |
| SCHOOL x YEAR | 0.093 | 2 | 0.047 | 2.247 | 0.113 |
| EXPLAINED | 6.886 | 5 | 1.377 | 66.394 | 0.000 |
| RESIDUAL | 1.431 | 69 | 0.021 | | |
| TOTAL | 8.317 | 74 | 0.112 | | |

on rephasal rate are independent. Consequently, it is possible to make statements about the effects of each of the factors without having to refer to the other. From Table III it can be seen that the rephasal rate increased for all schools in FY 1977. The joint effect accounts for 81.7% (6.793/8.317) of the variation in the rephasal rate. The school factor explains about 79.9% of the variation in rephasal rate, while the year factor explains about 2.1%. The total explained variation was 82.8% while the unexplained variation (residual) was 17.2%.

The results of the Two-way Analysis of Variance completed on the disenrollment rate is shown in Table V.

TABLE V

ANALYSIS OF VARIANCE - DISENROLLMENT RATE

| SOURCE OF VARIATION | SUM OF SQUARES | DF | MEAN SQUARE | F | SIGNIF OF F |
|---|---|---|---|---|---|
| MAIN EFFECTS | 0.357 | 3 | 0.119 | 17.490 | 0.000 |
| SCHOOL | 0.355 | 2 | 0.117 | 26.110 | 0.000 |
| YEAR | 0.003 | 1 | 0.003 | 0.376 | 0.542 |
| 2-WAY INTERACTIONS | | | | | |
| SCHOOL x YEAR | 0.000 | 2 | 0.000 | 0.029 | 0.971 |
| EXPLAINED | 0.357 | 5 | 0.071 | 10.506 | 0.000 |
| RESIDUAL | 0.469 | 69 | 0.007 | | |
| TOTAL | 0.826 | 74 | 0.011 | | |

From Table V it can be determined that the joint effect is significant while the interaction is not. Because there is no significant interaction effect the two main factors can be considered independently. Of the two main factors, only the school factor is significant in explaining variation in the disenrollment rate. The year factor is not significant, as indicated by the F test probability of 0.542. From Table III it can be seen that the disenrollment rate increased for all three schools for FY 1977. The joint effect explains 43.2% of the variation in disenrollment rate with the school factor accounting for 42.9% of this variation. The total explained variation is 43.2% and the unexplained variation is 56.8%.

C. SUMMARY

Through the analysis of the data collected for this study, it was determined that the lowering of the Class A selection scores did have a significant effect on rephasal rate but not on disenrollment rate. From Table IV it can be seen that both the school and year factors are significant in predicting rephasal rate. However, the school factor explains 79.9% of the variation in rephasal rate while the year factor only explains 2.1%. Concerning disenrollment rate, Table V indicates that the school factor is significant in predicting disenrollments but the year factor is not. For both these rates the interaction effect

is not significant; therefore, each factor can be considered independently of the other. An examination of this information indicates that while the school a student attends will have a significant effect on both the rephasal and disenrollment rates, the year a student attends, either prior to or after the lowering of the selection scores, has an effect on only the rephasal rate. This effect, however, is relatively small.

## III. STUDY TWO

### A. METHODOLOGY

Study Two focused on the analysis of the usable data collected for FY 1977. This data was collected on indivd-ual students, and a breakdown by school is provided in Table VI.

TABLE VI

USABLE DATA FOR FY 1977

| SCHOOL | NUMBER OF STUDENTS |
|---|---|
| STOREKEEPER | 144 |
| SUBSISTENCE SPECIALIST | 283 |
| RADIOMAN | 286 |
| TOTAL | 713 |

These students were divided into two categories: those entering Class A school with Basic Test Battery (BTB) selection scores greater than or equal to those in effect prior to July, 1976 and those entering with selection scores less than those in effect prior to July, 1976.

The primary objective of this study was to investigate and evaluate the outcome of the students entering with the lower BTB scores. This analysis was accomplished by comparing the effect that each student category had on the following dependent variables:

1) Rephasal - defined as the repeating of a class

because of academic, administrative, or medical problems.

2) Rephasal Rate - defined as the number of students rephased per total number of students (note: the rephasal rate for Study One was defined differently).

3) Disenrollment - defined as attrition from a school.

4) Disenrollment Rate - defined as the number of students disenrolled per total number of students.

5) Number of Rephasals - defined as the number of times a student had rephased.

A profile of the entering students was prepared for each individual school to provide background information. The background variables studied were divided into two groups, nuisance variables and the BTB selection scores.

Nuisance variables were those which might have an important impact on the previously mentioned dependent variables; however, a thorough analysis of this impact was beyond the scope of this study. These variables were included to remove or control effects other than BTB on the dependent variables in order to obtain a better estimate of the unique contribution of the BTB variables. They were also included to provide data for future research. These variables were:

1) School - defined as the three schools, Storekeeper School, Subsistence Specialist School, and Radioman School, from which the data was collected.

2) Source - students entered Class A school from either boot camp or a field unit.

3) Education - defined as the highest education level in years a student had completed.

4) Quarter - defined as the quarter a student commenced a school.

The third set of variables studied were the BTB selection scores. The scores utilized were:

1) GCT - General Classification Test score.

2) ARI - Arithmetic Test score.

3) COMB - defined as the combination of the GCT and ARI scores.

The final phase of Study Two was the analysis of the relationship between different variables for all three schools taken together and for each school considered individually. Of primary concern was the relationship with rephasal, disenrollment, and final grade. The first step was measuring the linear relationship between any two of the variables to determine how well each variable predicted the others. The second step was to study the linear relationship between a set of independent variables and a dependent variable while taking into account the interrelationships among the independent variables. The independent variables studied were school, source, education level, GCT score, ARI score, COMB score, and quarter. The dependent variables were rephasal, disenrollment, and

final grade. Through step two, a linear combination of independents variables was determined which would best predict values of the dependent variables, and the importance of each of the independent variables in that prediction was assessed. A significance level of .05 was utilized in all the analyses. For the correlation analyses this significance level is equivalent to an r no less than .073 for all schools considered together. An $r \geq .164$ for Storekeeper School, an $r \geq .117$ for Subsistence Specialist School and an $r \geq .116$ for Radioman School.

The following values were assigned to individual variables used in this part of Study Two:

| | | |
|---|---|---|
| Rephasal | - (0) not rephased | (1) rephased |
| Disenrollment | - (0) not disenrolled | (1) disenrolled |
| Source | - (1) field | (2) boot camp |
| Quarter | - (1) first of FY | (2) second |
| | (3) third | (4) fourth |
| Education | - (9) ninth year completed, etc. | |

These 12 regression analyses were accomplished because of the availability of the data and the possibility of initiating future study. A limited discussion follows each analysis; however, an in depth evaluation was not attempted because it was beyond the scope of this study. Of primary interest was the relationship between the BTB selection scores and the three dependent variables, rephasal, disenrollment, and final grade.

B. RESULTS AND DISCUSSION

1. Analysis of Students by BTB Selection Score

A breakdown of the students entering Storekeeper School, Subsistence Specialist School, and Radioman School is shown in Table VII. The students were divided into two categories determined by BTB selection scores being greater than or less than those in effect prior to July, 1976. The previous selection score for both Subsistence Specialist and Radioman Schools was a GCT + ARI of 100 while the previous score for Storekeeper School was a GCT + ARI of 105. The present selection score for all three schools is a GCT + ARI of 90.

TABLE VII

DISTRIBUTION OF STUDENTS BY CATEGORY

| SCHOOL | SCORE ≥ PREVIOUS SCORE | | SCORE < PREVIOUS SCORE | |
|---|---|---|---|---|
| | NUMBER OF STUDENTS | PERCENTAGE | NUMBER OF STUDENTS | PERCENTAGE |
| STOREKEEPER | 99 | 69 | 45 | 31 |
| SUBSISTENCE SPECIALIST | 173 | 61 | 110 | 39 |
| RADIOMAN | 216 | 76 | 70 | 24 |

From Table VII it can be determined that approximately 32% of the students entering these three schools during FY 1977 had a GCT + ARI combination less than that which was required for selection prior to July, 1976. The mean BTB scores for these schools for FY 1977 are shown in Table VIII.

TABLE VIII

MEAN BTB SELECTION SCORES

| SCHOOL | GCT | ARI | COMBINATION |
|---|---|---|---|
| STOREKEEPER | 57.29 | 53.56 | 110.79 |
| SUBSISTENCE SPECIALIST | 55.03 | 49.89 | 104.88 |
| RADIOMAN | 58.20 | 51.69 | 109.81 |
| TOTAL | 56.66 | 51.33 | 107.92 |

Entering students' education level was available for only the Storekeeper and Subsistence Specialist Schools. The distribution of number and percentage of students by category and highest education level attained is shown in Table IX. From this table it can be seen that students entering Storekeeper School with the lower BTB scores had a higher mean education level than the students entering with the higher BTB scores. The reverse is true for Subsistance Specialist School. However, the education level was unknown for 20% of the students attending this school.

Students in Class A schools originate from two different sources. Some of the students come from boot camp without going to a field unit while the remaining have acquired some field experience. Table X shows the distribution of students entering Class A school from these two sources.

From Table X it can be determined that there may be an important relationship between source and student

TABLE IX

EDUCATION LEVEL ATTAINED

| SCHOOL | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | UNK |
|---|---|---|---|---|---|---|---|---|---|---|
| STOREKEEPER | | | | | | | | | | |
| ≥ PREVIOUS SCORE | 3 | 1 | 3 | 67 | 9 | 11 | 0 | 3 | 1 | 1 |
| PERCENTAGE | 3 | 1 | 3 | 67 | 9 | 11 | 0 | 3 | 1 | 1 |
| MEAN | 12.35 | | | | | | | | | |
| < PREVIOUS SCORE | 0 | 0 | 0 | 33 | 6 | 2 | 2 | 1 | 0 | 1 |
| PERCENTAGE | 0 | 0 | 0 | 73 | 13 | 4 | 4 | 2 | 0 | 2 |
| MEAN | 12.45 | | | | | | | | | |
| TOTAL | 3 | 1 | 3 | 100 | 15 | 13 | 2 | 4 | 1 | 2 |
| PERCENTAGE | 2 | 1 | 2 | 69 | 10 | 9 | 1 | 3 | 1 | 1 |
| MEAN | 12.38 | | | | | | | | | |
| SUBSISTENCE SPECIALIST | | | | | | | | | | |
| ≥ PREVIOUS SCORE | 1 | 4 | 14 | 101 | 12 | 6 | 2 | 0 | 0 | 33 |
| PERCENTAGE | 1 | 2 | 8 | 58 | 7 | 4 | 1 | 0 | 0 | 19 |
| MEAN | 12.03 | | | | | | | | | |
| < PREVIOUS SCORE | 1 | 5 | 5 | 67 | 3 | 1 | 1 | 0 | 0 | 27 |
| PERCENTAGE | 1 | 5 | 5 | 61 | 3 | 1 | 1 | 0 | 0 | 25 |
| MEAN | 11.88 | | | | | | | | | |
| TOTAL | 1 | 9 | 19 | 168 | 15 | 7 | 3 | 0 | 0 | 60 |
| PERCENTAGE | 1 | 3 | 7 | 59 | 5 | 3 | 1 | 0 | 0 | 21 |
| MEAN | 11.97 | | | | | | | | | |

TABLE X

DISTRIBUTION OF STUDENTS BY SOURCE

| SCHOOL | BOOT CAMP | | FIELD | |
|---|---|---|---|---|
| | N | % | N | % |
| STOREKEEPER | | | | |
| ≥ PREVIOUS SCORE | 22 | 22.2 | 77 | 77.8 |
| < PREVIOUS SCORE | 8 | 17.8 | 37 | 82.2 |
| TOTAL | 30 | 21.8 | 114 | 79.2 |
| SUBSISTENCE SPECIALIST | | | | |
| ≥ PREVIOUS SCORE | 71 | 41.0 | 102 | 59.0 |
| < PREVIOUS SCORE | 28 | 25.5 | 82 | 74.5 |
| TOTAL | 99 | 35.0 | 184 | 65.0 |
| RADIOMAN | | | | |
| ≥ PREVIOUS SCORE | 107 | 49.5 | 109 | 50.5 |
| < PREVIOUS SCORE | 19 | 27.1 | 51 | 72.9 |
| TOTAL | 126 | 44.1 | 160 | 55.9 |
| TOTAL(ALL SCHOOLS) | 255 | 35.8 | 458 | 64.2 |

category. A thorough analysis of this relationship plus the effect of the variable source on training performance at Class A schools would be beneficial. This was not the objective of this study. Source was considered a nuisance variable, as was explained in the Methodology Section of this study.

The next step was to analyze the effect that student category had on rephasal and disenrollment. The results are shown in Table XI.

TABLE XI

EFFECT OF STUDENT CATEGORY ON REPHASAL AND DISENROLLMENT

| SCHOOL | STUDENTS | STUDENTS REPHASED | REPHASAL RATE | STUDENTS DISENROLLED | DISENROLLMENT RATE |
|---|---|---|---|---|---|
| STOREKEEPER | | | | | |
| ≥ PREVIOUS SCORE | 99 | 8 | 8.08 | 4 | 4.04 |
| < PREVIOUS SCORE | 45 | 16 | 35.6 | 5 | 11.1 |
| TOTAL | 144 | 24 | 16.6 | 9 | 6.30 |
| SUBSISTENCE SPECIALIST | | | | | |
| ≥ PREVIOUS SCORE | 173 | 15 | 8.70 | 20 | 11.6 |
| < PREVIOUS SCORE | 110 | 17 | 15.5 | 19 | 17.3 |
| TOTAL | 283 | 32 | 11.3 | 39 | 13.8 |
| RADIOMAN | | | | | |
| ≥ PREVIOUS SCORE | 216 | 115 | 53.2 | 37 | 17.1 |
| < PREVIOUS SCORE | 70 | 49 | 70.0 | 24 | 34.3 |
| TOTAL | 286 | 164 | 57.3 | 61 | 21.3 |

From Table XI it can be seen that students entering these schools with GCT + ARI combinations less than the previous selection scores had a higher incident of rephasals and disenrollments. The rephasal rate for these students versus students entering with the higher selection scores was 4.4 times greater for Storekeeper School, 1.8 times greater for Subsistence Specialist School and 1.3 times greater for Radioman School. The disenrollment rates for these same students were 2.7, 1.5, and 2.0 times greater for Storekeeper, Subsistence Specialist and Radioman Schools respectively.

The incidence of multiple rephasals (>1), however, was not generally higher for students entering these schools with lower selection scores. This is shown in Table XII.

2. Regression Analysis

The regression analyses reported in this section utilized the following variables: final grade (FG), rephasal (REP), disenrollment (DI), quarter (QT), source (SOU), education level (ED), GCT, ARI, and GCT + ARI (COMB). The primary objective of these analyses was to determine the relationship between the BTB selection scores and the three dependent variables, rephasal, disenrollment, and final grade. The other variables were included to remove or control effects other than BTB on the dependent variables in order to obtain a better estimate of the unique contribution

TABLE XII

NUMBER OF REPHASALS

| SCHOOL | 1 | % | 2 | % | 3 | % |
|---|---|---|---|---|---|---|
| STOREKEEPER | | | | | | |
| ≥PREVIOUS SCORE | 8 | 8.1 | 0 | 0 | 0 | 0 |
| <PREVIOUS SCORE | 16 | 35.6 | 1 | 2.2 | 0 | 0 |
| TOTAL | 24 | 16.6 | 1 | 0.7 | 0 | 0 |
| SUBSISTENCE SPECIALIST | | | | | | |
| ≥PREVIOUS SCORE | 15 | 8.6 | 2 | 1.2 | 0 | 0 |
| <PREVIOUS SCORE | 17 | 15.5 | 2 | 1.8 | 2 | 1.8 |
| TOTAL | 32 | 11.3 | 4 | 1.4 | 2 | 0.7 |
| RADIOMAN | | | | | | |
| ≥ PREVIOUS SCORE | 115 | 53.2 | 37 | 17.1 | 8 | 3.7 |
| <PREVIOUS SCORE | 49 | 70.0 | 11 | 15.7 | 7 | 10.0 |
| TOTAL | 164 | 57.3 | 48 | 16.8 | 15 | 5.2 |

of the BTB variables. They were also included to provide data for future research.

a. All Schools

The variable education level (ED) was not included in the following analyses for all three schools because it was not available for the students attending Radioman School. A correlation matrix determined for all the schools is shown in Table XIII.

TABLE XIII

CORRELATION MATRIX FOR ALL SCHOOLS

| | GCT | ARI | COMB | SOU | QT | DI | REP | FG |
|---|---|---|---|---|---|---|---|---|
| GCT | 1.0 | | | | | | | |
| ARI | .510 | 1.0 | | | | | | |
| COMB | .883 | .850 | 1.0 | | | | | |
| SOU | .243 | .124 | .212 | 1.0 | | | | |
| QT | -.016 | .010 | -.005 | -.068 | 1.0 | | | |
| DI | -.106 | -.168 | -.158 | -.012 | .006 | 1.0 | | |
| REP | -.039 | -.144 | -.100 | -.066 | .063 | .097 | 1.0 | |
| FG | .090 | .169 | .149 | -.046 | .043 | -.368 | -.292 | 1.0 |

From Table XIII it can be determined that of the BTB selection scores, the best single predictor of rephasal, disenrollment, and final grade was the ARI score. This table also shows the high inter-correlations among GCT, ARI, and COMB.

A stepwise multiple regression was completed to determine the best predictors of rephasal, disenrollment, and final grade. The results are shown in Table XIV. A set of dummy variables was created to account for the three schools. Dummy variable S1 refers to Storekeeper School and S2 refers to Subsistence Specialist School, with Radioman School utilized as the reference category.

The results of the stepwise multiple regression analysis shown in Table XIV indicates that the individual schools are very important in predicting rephasal, disenrollment, and final grade. This is consistent with the findings in Table XI which shows that each school has a considerably different rephasal rate and disenrollment rate. Therefore, by knowing the mean rephasal rate, disenrollment rate, and final grade and which school a student is attending, one could predict the chances of the student's successful completion of that school. Why there is an individual school difference in these three dependent variables could be a subject for further study. Such factors as diversification of material being taught, percentage of students from the two BTB categories (Table VII), training and personnel management problems of the individual schools, etc., could be analyzed. As stated previously, school was considered a nuisance variable.

The ARI score was also statistically significant in predicting the dependent variables. The remaining

TABLE XIV

STEPWISE REGRESSION FOR REPHASAL, DISENROLLMENT AND FINAL GRADE

| DEPENDENT VARIABLE | INDEPENDENT VARIABLES | MULTIPLE r | SIMPLE r | B | BETA |
|---|---|---|---|---|---|
| REPHASAL | S2 | 0.3616 | -0.3616 | -0.5022 | -0.5306 |
| | S1 | 0.4872 | -0.1531 | -0.3825 | -0.3367 |
| | ARI | 0.5195 | -0.1436 | -0.0126 | -0.1843 |
| | (constant) | | | 1.2213 | |

Y' = 1.2213 -0.5022(S2 dummy) -0.3825(S1 dummy) -0.0126(ARI)

F = 85.26 d.f. = 3, 692

| | | | | | |
|---|---|---|---|---|---|
| DISENROLLMENT | ARI | 0.1681 | -0.1681 | -0.0088 | -0.1708 |
| | S2 | 0.1911 | -0.0590 | -0.1077 | -0.1499 |
| | S1 | 0.2344 | -0.1166 | -0.1285 | -0.1490 |
| | (constant) | | | 0.6636 | |

Y' = 0.6636 -.0088(ARI) -0.1077(S2 dummy) -0.1285(S1 dummy)

F = 13.41 d.f. = 3, 692

| | | | | | |
|---|---|---|---|---|---|
| FINAL GRADE | S2 | 0.2234 | 0.2234 | 6.1247 | 0.3215 |
| | ARI | 0.3112 | 0.1692 | 0.2927 | 0.2127 |
| | S1 | 0.3324 | 0.0205 | 2.8980 | 0.1302 |
| | (constant) | | | 65.6230 | |

Y' = 65.623 + 6.1247(S2 dummy)+0.2927(ARI)+2.898(S1 dummy)

F = 24.55 d.f. = 3, 593

independent variables: quarter, source, GCT, and COMB were found not statistically significant and therefore not included in Table XIV.

b. Storekeeper School

A correlation matrix determined for Storekeeper School is shown in Table XV. This table shows that of the BTB selection scores, COMB is the best single predictor of final grade and rephasal while the GCT score is the best predictor of disenrollment. It also shows the high intercorrelations among the GCT, ARI, and COMB scores.

A stepwise multiple regression was completed to find the best predictors of the dependent variables, rephasal, disenrollment, and final grade. The results are shown in Tables XVI, XVII, and XVIII.

TABLE XV

CORRELATION MATRIX FOR STOREKEEPER SCHOOL

| | FG | REP | DI | QT | SOU | GCT | ARI | COMB | ED |
|---|---|---|---|---|---|---|---|---|---|
| FG | 1.0 | | | | | | | | |
| REP | -.244 | 1.0 | | | | | | | |
| DI | -.961 | .141 | 1.0 | | | | | | |
| QT | .077 | .133 | -.056 | 1.0 | | | | | |
| SOU | -.043 | .053 | .023 | -.042 | 1.0 | | | | |
| GCT | .460 | -.211 | -.153 | -.116 | .219 | 1.0 | | | |
| ARI | .519 | -.234 | -.058 | -.136 | .083 | .418 | 1.0 | | |
| COMB | .590 | -.266 | -.127 | -.149 | .185 | .847 | .832 | 1.0 | |
| ED | .125 | -.096 | -.081 | -.073 | .054 | .105 | .177 | .149 | 1.0 |

TABLE XVI

STEPWISE REGRESSION FOR REPHASAL

| DEPENDENT VARIABLE | INDEPENDENT VARIABLES | MULTIPLE r | SIMPLE r | B | BETA |
|---|---|---|---|---|---|
| REPHASAL | COMB | 0.2657 | -0.2657 | -0.0089 | -0.2657 |
| | (constant) | | | 1.1103 | |

Y' = 1.1103 -0.0089(COMB score)

F = 10.64 d.f. = 1, 140

This analysis shows that only the B associated with the combination score was statistically significant in predicting rephasal. The Bs associated with GCT, ARI, quarter, source and education were found not statistically significant.

TABLE XVII

STEPWISE REGRESSION FOR DISENROLLMENT

| DEPENDENT VARIABLE | INDEPENDENT VARIABLES | MULTIPLE r | SIMPLE r | B | BETA |
|---|---|---|---|---|---|
| DISENROLLMENT | GCT | 0.1528 | -0.1528 | -0.0053 | -0.1528 |
| | (constant) | | | 0.3594 | |

Y' = 0.3594 -0.0053(GCT)

F = 3.95 d.f. = 1, 140

The GCT score was the only significant predictor of disenrollment. The other independent variables were found to be not significant.

TABLE XVIII

STEPWISE REGRESSION FOR FINAL GRADE

| DEPENDENT VARIABLE | INDEPENDENT VARIABLES | MULTIPLE r | SIMPLE r | B | BETA |
|---|---|---|---|---|---|
| FINAL GRADE | COMB | 0.5895 | 0.5895 | 0.2882 | 0.6332 |
| | QT | 0.6097 | 0.0768 | 0.6039 | 0.1526 |
| | SOU | 0.6254 | -0.0434 | -1.7298 | -0.1415 |
| | (constant) | | | 52.7940 | |

Y' = 52.794 +0.2882(COMB) +0.1526(QT score) -0.1415(SOU score)

F = 27.84 d.f. = 3, 130

The combination score contributed most toward predicting final grade. Although the variables GCT and ARI, when considered alone, were highly correlated with final grade, when they are considered in a stepwise multiple

regression with the other independent variables their contribution is statistically insignificant. This reflects the inter-correlation among the BTB selection scores.

The nuisance variables quarter and source provided additional information for predicting final grade. However, further analysis of these variables was not attempted in this study. The contribution from the remaining independent variables was not statistically significant.

c. Subsistence Specialist School

A correlation matrix determined for Subsistence Specialist School is shown in Table XIX.

TABLE XIX

CORRELATION MATRIX FOR SUBSISTENCE SPECIALIST SCHOOL

| | FG | REP | DI | QT | SOU | GCT | ARI | COMB | ED |
|---|---|---|---|---|---|---|---|---|---|
| FG | 1.0 | | | | | | | | |
| REP | -.084 | 1.0 | | | | | | | |
| DI | -.991 | .265 | 1.0 | | | | | | |
| QT | .262 | .066 | .102 | 1.0 | | | | | |
| SOU | -.029 | -.001 | -.077 | -.044 | 1.0 | | | | |
| GCT | .246 | -.018 | -.088 | .062 | .202 | 1.0 | | | |
| ARI | .314 | -.112 | -.185 | .072 | .099 | .521 | 1.0 | | |
| COMB | .325 | -.069 | -.150 | .082 | .172 | .897 | .842 | 1.0 | |
| ED | .256 | -.050 | -.044 | .139 | -.033 | .154 | .090 | .143 | 1.0 |

This analysis indicates that of the BTB selection scores, the combination is the best single

predictor of final grade while the ARI score is the best predictor of disenrollment. The ARI score, though the best predictor of rephasal, is not statistically significant at the .05 level. There is also a high correlation between the nusiance variable education and the variable final grade. This relationship is not analyzed in this study. Table XIX also shows the high inter-correlations between the BTB selection scores.

A stepwise multiple regression was completed on the dependent variables rephasal, disenrollment, and final grade. The results are shown in Tables XX, XXI, and XXII.

TABLE XX

STEPWISE REGRESSION FOR REPHASAL

| DEPENDENT VARIABLE | INDEPENDENT VARIABLES | MULTIPLE r | SIMPLE r | B | BETA |
|---|---|---|---|---|---|
| REPHASAL | ARI | 0.1122 | -0.1122 | -0.0049 | -0.1122 |
| | (constant) | | | 0.3292 | |

Y' = 0.3292 -0.0049(ARI score)

F = 3.96 d.f. = 1, 217

This analysis shows that only the B associated with the ARI score was statistically significant in predicting rephasal. The Bs associated with the other independent variables were found not statistically significant.

TABLE XXI

STEPWISE REGRESSION FOR DISENROLLMENT

| DEPENDENT VARIABLE | INDEPENDENT VARIABLES | MULTIPLE r | SIMPLE r | B | BETA |
|---|---|---|---|---|---|
| DISENROLLMENT | ARI | 0.1845 | -0.1845 | -0.0091 | -0.1928 |
| | QT | 0.2175 | 0.1017 | 0.0338 | 0.1155 |
| | (constant) | | | 0.4650 | |

Y' = 0.4650 -0.0091(ARI score) +0.0338(QT score)

F = 5.36 d.f. = 2, 216

The ARI score contributed most towards predicting disenrollment. The nuisance variable quarter provided additional information for predicting disenrollment. However, further analysis of this variable was not attempted in this study. The contribution from the remaining independent variables was not statistically significant.

TABLE XXII

STEPWISE REGRESSION FOR FINAL GRADE

| DEPENDENT VARIABLE | INDEPENDENT VARIABLES | MULTIPLE r | SIMPLE r | B | BETA |
|---|---|---|---|---|---|
| FINAL GRADE | COMB | 0.3249 | 0.3249 | 0.0844 | 0.2727 |
| | QT | 0.3932 | 0.2624 | 0.7089 | 0.1950 |
| | ED | 0.4324 | 0.2562 | 0.8115 | 0.1839 |
| | (constant) | | | 65.6339 | |

Y' = 65.6339 +0.0844(COMB) +0.7089(QT score) +0.8115(ED score)

F = 14.71 d.f. = 3, 192

The combination score was the best predictor of final grade. Although the variables GCT and ARI, when considered alone, were highly correlated with final grade, when they are considered in a stepwise regression with the other independent variables their contribution is statistically insignificant. This reflects the high intercorrelations among the BTB selection scores.

The nuisance variables quarter and education provided additional information for predicting final grade. However, further analysis of these variables was not attempted in this study. The contribution from the remaining independent variables was not statistically significant.

d. Radioman School

A correlation matrix determined for Radioman School is shown in Table XXIII.

TABLE XXIII

CORRELATION MATRIX FOR RADIOMAN SCHOOL

| | FG | REP | DI | QT | SOU | GCT | ARI | COMB |
|---|---|---|---|---|---|---|---|---|
| FG | 1.0 | | | | | | | |
| REP | -.226 | 1.0 | | | | | | |
| DI | -.439 | -.092 | 1.0 | | | | | |
| QT | -.020 | -.006 | -.095 | 1.0 | | | | |
| SOU | .014 | .013 | -.009 | -.096 | 1.0 | | | |
| GCT | .152 | -.175 | -.161 | -.003 | .232 | 1.0 | | |
| ARI | .212 | -.235 | -.209 | .074 | .189 | .543 | 1.0 | |
| COMB | .206 | -.229 | -.207 | .035 | .234 | .880 | .871 | 1.0 |

This analysis indicates that of the BTB selection scores, the ARI score is the best single predictor of rephasal, disenrollment, and final grade. It also shows a high inter-correlation among the BTB selection scores.

A stepwise multiple regression was completed on the dependent variables rephasal, disenrollment, and final grade. The results are shown in Tables XXIV, XXV, and XXVI. These results show that only the B associated with the ARI score was statistically significant in predicting the three dependent variables. The Bs associated with the other independent variables were found not statistically significant in all three cases.

TABLE XXIV

STEPWISE REGRESSION FOR REPHASAL

| DEPENDENT VARIABLE | INDEPENDENT VARIABLES | MULTIPLE r | SIMPLE r | B | BETA |
|---|---|---|---|---|---|
| REPHASAL | ARI | 0.2353 | -0.2353 | -0.0171 | -0.2353 |
| | (constant) | | | 1.4553 | |

Y' = 1.4553 -.0171(ARI score)

F = 16.59 d.f. = 1, 283

TABLE XXV

| DEPENDENT VARIABLE | INDEPENDENT VARIABLES | MULTIPLE r | SIMPLE r | B | BETA |
|---|---|---|---|---|---|
| DISENROLLMENT | ARI | 0.2088 | -0.2088 | -0.0125 | -0.2088 |
| | (constant) | | | 0.8562 | |

Y' = 0.8562 -0.0125(ARI score)

F = 12.90 d.f. = 1, 283

TABLE XXVI

| DEPENDENT VARIABLE | INDEPENDENT VARIABLES | MULTIPLE r | SIMPLE r | B | BETA |
|---|---|---|---|---|---|
| FINAL GRADE | ARI | 0.2118 | 0.2118 | 0.3765 | 0.2118 |
| | (constant) | | | 61.2327 | |

Y' = 61.2327 +0.3765(ARI score)

F = 10.52 d.f. = 1, 224

C. SUMMARY

From the data collected for Study Two, it was determined that approximately 1/3 of the students attending Storekeeper, Subsistence Specialist, and Radioman Schools during FY 1977 had BTB selection scores lower than the previous cutoff score. The exact percentage for each school was shown in Table VII. The effect of these students on rephasal and disenrollments was shown in Table XI. Students with the lower BTB scores had a substantially greater incidence of rephasals and disenrollments than the students with the higher BTB scores. However, the incidence of multiple rephasals was approximately the same

for both student categories. In the future, if the input changes are such that there is an increase in the percentage of students entering these schools with the lower BTB selection scores, there could be a significant increase in both rephasal and disenrollment rates.

The analysis completed in this study also showed that the best predictors for rephasal, disenrollment, and final grade when all the schools were considered together was knowing the individual school a student was attending and his ARI score. However, from Table XIV it can be seen that only a small amount of the variance of these dependent variables could be accounted for. For rephasal, 27% (24% by the schools and 3% by ARI score) of the variance was accounted for while 73% was not. For disenrollment, only 5.4% (2.6% by the schools and 2.8% by ARI score) of the variance was accounted for while 94.6% was not. For final grade, 11% (4.5% by the schools and 6.5% by ARI score) was accounted for while 89% was not.

When an analysis was completed for individual schools, it was discovered that other variables besides the ARI score were good predictors of the dependent variables. For Radioman School alone the ARI score was the only statistically significant predictor of all three dependent variables. It was also the best predictor of rephasal and disenrollment but not final grade in Subsistence School. The ARI score was not a statistically significant predictor for any of

the three dependent variables for Storekeeper School. In each of these analyses only a small amount of the variance in the dependent variables could be explained. However, an analysis by individual school is necessary to determine the significant predictors of rephasal, disenrollment, and final grade for each school.

There were several variables mentioned but not analyzed in this study that could have an effect on the training performance of students attending Class A schools. These were labeled nuisance variables and included the variables school, source, quarter, and education. Further analysis of each of these variables should prove beneficial in predicting success at Class A schools.

## IV. CONCLUSIONS

The purpose of this analysis was to investigate and evaluate the effect that lowering the BTB selection scores in July, 1976, had on rephasals and disenrollments from Class A schools. Further attention was also given to the outcome of students entering with the lower BTB scores. From the data that was available for Study One it was determined that lowering the BTB selection score had a small but statistically significant effect on rephasal rate but not disenrollment rate. Rephasal rate increased from FY 1976 to FY 1977.

Through the results of Study Two it was shown that students entering Storekeeper, Subsistence Specialist, and Radioman Schools with lower BTB scores had a greater incidence of rephasals and disenrollments. During FY 1977, 1/3 of the students attending these schools entered with lower BTB selection scores than those in effect prior to July, 1976. If the input percentage of these students increased there should be a significant increase in both the rephasal and disenrollment rates for these schools, and not just the rephasal rate as indicated in Study One.

If it becomes necessary in the future of the Coast Guard to accommodate a higher percentage of less qualified personnel for Class A school, further study for all schools will have to be carried out concerning rephasal and

disenrollment. A thorough analysis for each individual school and not generalized assumptions from a study of selected schools would be required to determine the best predictors of success. Other variables besides BTB scores should be considered. Lang (Ref. 2) determined that an ASVAB composite or an ASVAB and BTB composite might be a better predictor of success than just a BTB composite. Boot camp grades should be taken into consideration. Based on a thorough analysis of selection criteria for Class A school, rephasal and disenrollment rates could be kept to a minimum for personnel determined as less qualified.

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An analysis of the effect of lowered basic test battery selection scores on rephasals and disenrollments at selected Coast Guard class A schools.